

Having thus, described the invention, what is claimed is:

1           1.       A multi-cylinder internal combustion engine, comprising an engine block  
2       having a plurality of oil galleries formed therein, an oil filter and an oil cooler operatively  
3       attached to the engine block, and a balancer rotatably disposed within said engine block;  
4                wherein said oil filter is attached to a side surface of said engine block;  
5                wherein said oil cooler and said balancer are each respectively attached to a front  
6       central portion of said multi-cylinder internal combustion engine;  
7                said engine further comprising an oil pan and an oil pump for drawing oil from an oil  
8       reservoir portion of the oil pan and for supplying the oil to individual portions of the internal  
9       combustion engine after passing the oil through the oil filter and the oil cooler;  
10              wherein said engine is configured so that oil from said oil cooler is introduced to a  
11       substantially central part of a main oil gallery formed in said engine block.

1           2.       A multi-cylinder internal combustion engine as set forth in claim 1, further  
2       comprising a crankshaft having a plurality of crankshaft webs, wherein said balancer  
3       comprises a driven gear and wherein an intermediate crankshaft web of said crankshaft is

4 provided with a drive gear thereon; and wherein said drive gear on said crankshaft is meshed  
5 with the driven gear of said balancer so as to thereby drive said balancer.

1 3. A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2 said oil filter can be detached from said engine without interference from components of said  
3 engine.

1 4. A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2 said oil cooler improves oil flow throughout said engine so that oil pressure is uniform.

1 5. A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2 said oil filter comprises an oil filter case and an oil filter element.

1 6. A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2 said oil cooler and said balancer are so situated throughout said engine so as to maintain a  
3 weight balance from left to right.

1           7.       A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2       said oil cooler is utilized with a water-cooled version of said engine, and wherein an  
3       additional cooling effect is achieved by running airflow over said oil cooler when said  
4       engine is moving through space.

1           8.       A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2       said engine comprises  
3       a crankshaft comprising webs, and  
4       bearings surrounding said crankshaft webs,  
5       and wherein said oil cooler supplies oil, which is of uniform pressure and has a  
6       cooling effect, to said bearings of said engine.

1           9.       A multi-cylinder internal combustion engine as set forth in claim 8, wherein  
2       said balancer is powered by driving mechanism which is narrower than one of said  
3       crankshaft webs.

1           10.      A multi-cylinder internal combustion engine as set forth in claim 1, wherein

2        said oil filter case is easily removable for ease of maintenance.

1            11.        A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2        said balancer is located near the gear drive assembly unit.

1            12.        A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2        said oil cooler is disposed at the front of said engine, so that said oil cooler is receptive of  
3        moving airflow.

1            13.        A multi-cylinder internal combustion engine as set forth in claim 1, wherein  
2        said oil cooler is disposed centrally along said engine, so as to distribute oil evenly to said  
3        engine internal components.

1            14.        A multi-cylinder internal combustion engine adapted to be transversely mounted  
2        in a vehicle frame, said engine comprising  
3        an engine block having a front surface and having a plurality of oil galleries formed

4     therein;

5             a crankshaft disposed in the engine block and having a longitudinal axis which is

6     substantially parallel to the front surface of the engine block;

7             an oil cooler attached to the front surface of the engine block; and

8             a balancer rotatably disposed in the engine block and comprising a balance weight;

9             wherein the oil cooler and the balancer are respectively disposed proximate a

10    substantially central portion of the front surface of the engine block.

1             15.   The internal combustion engine of claim 14, further comprising an oil filter

2     situated proximate the oil cooler and oriented substantially orthogonal thereto.

1             16.   The internal combustion engine of claim 14, wherein the crankshaft has an

2     integral balancer drive gear thereon, and the balancer comprises a driven gear which is

3 enmeshed with said balancer drive gear.

1 17. The internal combustion engine of claim 14, wherein said engine comprises a  
2 balancer support shaft which is supported and non-rotatably fixed onto an interior wall of the  
3 engine block, and wherein said balancer is rotatably mounted on said balancer support shaft.

1 18. The internal combustion engine of claim 14, wherein the oil cooler is mounted  
2 on the front side of an intermediate cylinder, and wherein the balancer is positioned on the  
3 front side of another intermediate cylinder.

1 19. The internal combustion engine of claim 14, wherein said engine is configured so  
2 that oil from said oil cooler is introduced to a substantially central part of a main oil gallery  
3 formed in said engine block.

1           20.    A motorcycle, comprising:  
2                a frame, and  
3                an internal combustion engine mounted transversely in said frame, wherein the  
4    internal combustion engine is the engine of claim 14.